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Some Past Presentations:

Open Source and Free Software
Protecting Your Identity
Keeping Mobile Devices Secure
3D Printing, ENABLE project
Flash Drives-Not Just for Storage
Features, Mac OS X & Windows
Tablets, the Programs and Uses
Personal Finance Software
Amazing Browser Tips
Linux is Like Cars
Close up Photography

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The Rochester Computer Society, Inc.

a computer/tech club open to everyone

MONITOR

Vol. 36, No. 09 September 2018

Tues, September 11, Video Night
videos from the World Cup to the state of fusion energy
presented by Tony Dellelo

Tues, October 9
'Cyber Awareness Month' presentation
by Norbert (Bob) Gosticha, via Zoom

Tues, November 13
6:30 Help's Half Hour, 7:00 Business, 7:15 Main Presentation
our meetings end between 8:30 and 9:00 pm

In This Issue

Excerpts From Several Articles on Fusion Energy

Nuclear Fusion Project (ITER)

Found on Youtube, 4/2018

ITER (International Thermonuclear Experimental Reactor) is an international nuclear fusion research and engineering megaproject, which will be the world's largest magnetic confinement plasma physics experiment. It is an experimental tokamak nuclear fusion reactor that is being built next to the Cadarache facility in Saint-Paul-lès-Durance, in Provence, southern France.

The ITER thermonuclear fusion reactor has been designed to produce a

Special Interest Group

Linux Sig

The workshop is the **third Saturday of each month**, at Interlock Rochester, 1115 East Main St. www.interlockroc.org

Enter through door #7 on the end of building, near *Comics Etc* and Goodman St. Find 'Interlock' on the intercom directory to get buzzed in and go upstairs to suite #200. We have experts on hand to fix problems and answer questions about Linux and FOSS (free and open source software). Bring your system in so we can help you get the most out of it. Hope to see you there.

Free, **Virtual Technology Conferences**, ONLINE
presented by APCUG

Saturdays: 8/18, 11/3

For Conference Description & Registration Links, go to apcug2.org/category/ **virtual-tech-conference**

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fusion plasma equivalent to 500 megawatts of thermal output power for around twenty minutes while 50 megawatts of thermal power are injected into the tokamak, resulting in a ten-fold gain of plasma heating power. Thereby the machine aims to demonstrate the principle of producing more thermal power from the fusion process than is used to heat the plasma, something that has not yet been achieved in any fusion reactor. The total electricity consumed by the reactor and facilities during peak periods of plasma operation will be as much as 620 MW. The reactor is only designed to produce a fusion plasma, and the emitted heat from the fusion reaction will be vented to the atmosphere without generating electricity. ITER's planned successor, DEMO, is expected to be the first fusion reactor to produce electricity in an experimental environment. DEMO's anticipated success is expected to lead to full-scale electricity-producing fusion power stations and future commercial reactors.

The project is funded and run by seven member entities—the European Union, India, Japan, China, Russia, South Korea, and the United States. The EU, as host party for the ITER complex, is contributing about 45 percent of the cost, with the other six parties contributing approximately 9 percent each. In 2016 the ITER organization signed a technical cooperation agreement with the national nuclear fusion agency of Australia, enabling this country access to research results of ITER in exchange for construction of selected parts of ITER machine.

Construction of the ITER Tokamak complex started in 2013 and the building costs are now over US$14 billion as of June 2015. The facility is expected to finish its construction phase in 2021 and will start commissioning the reactor that same year. Initial plasma experiments are scheduled to begin in 2025, with full deuterium–tritium fusion experiments starting in 2035. If ITER becomes operational, it will become the largest magnetic confinement plasma physics experiment in use with a plasma volume of 840 cubic meters, surpassing the Joint European Torus by almost a factor of 10. The first commercial demonstration fusion power station, named DEMO, is proposed to follow on from the ITER project.

Oak Ridge National Laboratory

Published on 7 Sep 2017

US ITER, with General Atomics and other industry partners, is now fabricating the heart of the ITER tokamak: the 60 foot tall central solenoid. This massive electromagnet will initiate and maintain plasma current in the international ITER fusion reactor now under construction in France. ITER is the first fusion device designed to produce a burning plasma--an essential step for fusion energy development. GA Magnet Technologies Center in California is where the central solenoid modules are being produced.

Three articles on the University of Rochester's laser research lab

Welcome to LLE (Laboratory for Laser Energetics)

With the construction of the National Ignition Facility, a $1.5 billion, 1.8-MJ laser at the Lawrence Livermore National Laboratory, the field of high-energy-density physics (HEDP) and ICF will be among the leading research areas in physics. The University of Rochester, with its 60-beam, 30-KJ OMEGA laser system housed in the Laboratory for Laser Energetics (LLE), is the world's leading academic institution in the field.

The Omega system gives the University unique access to high energy density plasma environments, which no

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Planning Meeting

Held on 1st Tuesday of each month at 7 pm, at St. John's Meadows, Briarwood building.

Newsletter Printing

The newsletter was printed at St John's/Chestnut Court by the printing group, with the help of Don Wilder (computer and printer operator). *We will try and print on the 1st or 2nd* ***Thursday morning****, following the monthly meeting.*

other university can offer. Current research in ICF involves laser-plasma interactions (Professor Froula), hydrodynamic and plasma stability (Professor Betti, Professor McCrory) and theoretical plasma physics (Professor Jason Myatt).

The Tenth Anniversary of OMEGA EP, May 2018

Ten years ago, OMEGA EP (extended performance), one of two kilojoule-class laser systems at the University of Rochester's Laboratory for Laser Energetics, went into operation. Commisioning of OMEGA EP, built directly adjacent to the OMEGA laser, was completed in April 2008. It supports a wide variety of target-irradiation conditions including pulses having multikilojoule energies, picosecond pulse widths, near-petawatt powers, and ultrahigh intensities of ~10^{20} W/cm^2. The laser beams can be delivered to the 60-beam OMEGA target chamber, or, alternatively, to the independent OMEGA EP target chamber. The co-location of the petawatt capability of the OMEGA EP laser with the well-established compression OMEGA laser offers a unique platform to experimentally verify laboratory ignition-relevant design models. The short-pulse and long-pulse systems operating jointly can interrogate high-temperatures and materials in high-energy-density (HED) regimes of greater

than one million atmospheres of pressure.

OMEGA and OMEGA EP are the two laser facilities made available to U.S. academic institutions through the National Laser Users' Facility (NLUF). Through the NLUF, OMEGA and OMEGA EP are accessible to conduct basic research experiments in ICF, high-energy-density physics, and other laser–matter interactions. They also provide research experience to maintain a corps of scientists specially trained to meet the nation's future needs in these areas of science and technology. In contrast to other major ICF/high-energy-density science (HEDS) facilities, external users lead more than 60% of experiments executed at LLE. The large number of shots, state-of-the-art facilities, and university setting provide an attractive environment for training and education. Over the last two decades, LLE has fostered and enabled excellence in research and student education on OMEGA and OMEGA EP by 40 Universities. These users include MIT; University of Michigan; SUNY Geneseo; Princeton University; UC San Diego; Stanford University; Syracuse University; University of Arizona; University of Florida; UC Berkeley; University of Nevada, Reno; UC Davis; Howard University; and others.

* * * * *

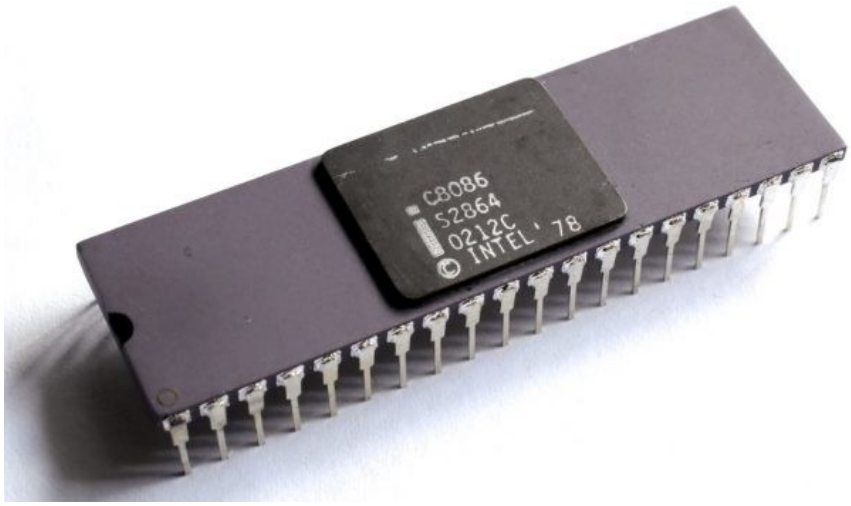
The Laboratory for Laser Energetics (LLE) at the University of Rochester holds an annual summer research program for Rochester-area high school students who have just completed their junior year. The eight-week program provides an exceptional opportunity for highly motivated students to experience scientific research in a realistic environment. Students who are accepted into the program are assigned to a research project and supervised by a staff scientist at the Laboratory. These projects form an integral part of the research program of the Laboratory and are related to the Laboratory's 60-beam OMEGA laser, one of the world's most powerful fusion lasers, and the OMEGA EP laser, completed in 2008.

* * * End of Article * * *

Happy 40th Anniversary to the Original Intel 8086 and the x86 Architecture

By Joel Hruska

Forty years ago today, Intel launched the original 8086 microprocessor — the grandfather of every x86 CPU ever built, including the ones we use now. This, it must be noted, is more or less the opposite outcome of what everyone expected at the time, including Intel.



According to Stephen P. Morse, who led the 8086 development effort, the new CPU "was intended to be short-lived and not have any successors." Intel's original goal with the 8086 was to improve overall performance relative to previous products while retaining source compatibility with earlier products (meaning assembly language for the 8008, 8080, or 8085 could be run on the 8086 after being recompiled). It offered faster overall performance than the 8080 or 8085 and could address up to 1MB of RAM (the 8085 topped out at 64KB). It contained eight 16-bit registers, which is where the x86 abbreviation comes from in the first place, and was originally offered at a clock speed of 5MHz (later versions were clocked as high as 10MHz).

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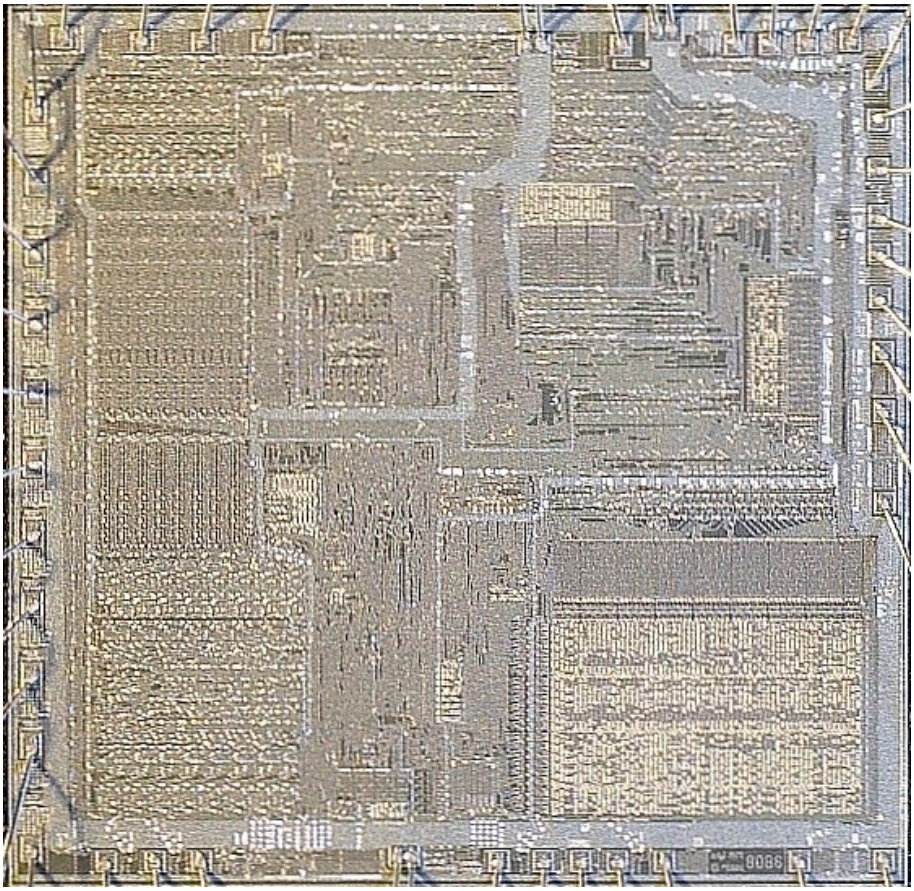
Computer Recycling

Some Residential Drop off Locations: **Call first**, to find out what is accepted, especially for 'tube type' tvs or monitors.

23 Sep, 2018 Senator Robach – Ecopark, 10 Avion Drive – Rochester, 9:30 am - 12:30 pm. Rain or shine… drive through and we'll unload your electronics! Limit of two CRT (tube) monitors or televisions per vehicle.

TSC Computer & Electronics Repair, accepts most electronic waste, including printers. Does not accept crt type monitors or tvs. They are located at 765 Elmgrove Road, Gates. 429-6880, www.tscelectronics.com

Microworx accepts most electronic waste (large monitors/crt's, 50 cents/pound), located at 20 Allens Creek Road. Brighton. 585-271-0050



8086 CPU die. Image by Wikipedia

Morse had experience in software as well as hardware and, as this historical retrospective makes clear, made decisions intended to make it easy to maintain backwards compatibility with earlier Intel products. He even notes that had he known he was inventing an architecture that would power computing for the next 40 years, he would've done some things differently, including using a symmetric register structure and avoiding segmented addressing. Initially, the 8086 was intended to be a stopgap product while Intel worked feverishly to finish its *real* next-generation microprocessor — the iAPX 432, Intel's first 32-bit microprocessor. When sales of the 8086 began to slip in 1979, Intel made the decision to launch a massive marketing operation around the chip, dubbed Operation Crush. The goal? Drive adoption of the 8086 over and above competing products made by Motorola and Zilog (the latter founded by former Intel employees, including Federico Faggin, lead architect on the first microprocessor, Intel's 4004). Project Crush was quite successful and is credited with spurring IBM to adopt the 8088 (a cut-down 8086 with an 8-bit bus) for the first IBM PC.

One might expect, given the x86 architecture's historic domination of the computing industry, that the chip that launched the revolution would have been a towering achievement or quantum leap above the competition. The truth is more prosaic. The 8086 was a solid CPU core built by intelligent architects backed up by a strong marketing campaign. The computer revolution it helped to launch, on the other hand, transformed the world.

All that said, there's one other point we want to touch on.

It's Been 40 Years. Why Are We Still Using x86 CPUs?

This is a simple question with a rather complex answer. First, in a number of very real senses, we aren't *really* using x86 CPUs anymore. The original 8086 was a chip with 29,000 transistors. Modern chips have transistor counts in the billions. The modern CPU manufacturing process bears little resemblance to the nMOS manufacturing process used to implement the original design in 1978. The materials used to construct the CPU are themselves very different and the advent of EUV (Extreme Ultraviolet Lithography) will transform this process even more.

Modern x86 chips translate x86 microcode into internal micro-ops for more efficient execution. They implement features like out-of-order execution and speculative execution to improve performance and limit the impact of slow memory buses (relative to CPU clocks) with multiple layers of cache and capabilities like branch prediction. People often ask "Why are we still using x86 CPUs?" as if this was analogous to "Why are we still using the 8086?" The honest answer is: We aren't. An 8086 from 1978 and a Core i7-8700K are both CPUs, just as a Model T and 2018 Toyota are both cars — but they don't exactly share much *beyond* that most basic classification.

Furthermore, Intel tried to replace or supplant the x86 architecture multiple times. The iAPX 432, Intel i960, Intel i860, and Intel Itanium were all intended to supplant x86. Far from refusing to consider alternatives, Intel literally spent billions of dollars over multiple decades to bring those alternative visions to life. The x86 architecture won these fights — but it didn't just win them because it offered backwards compatibility. We spoke to Intel Fellow Ronak Singhal for this article, who pointed out a facet of the issue I honestly hadn't considered before. In each case,

x86 continued to win out against the architectures Intel intended to replace it *because* the engineers working on those x86 processors found ways to extend and improve the performance of Intel's existing micro architectures, often beyond what even Intel engineers had thought possible years earlier.

Is there a penalty for continuing to support the original x86 ISA? There is — but today, it's a tiny one. The original Pentium may have devoted up to 30 percent of its transistors to backwards compatibility, and the Pentium Pro's bet on out-of-order execution and internal micro-ops chewed up a huge amount of die space and power, but these bets paid off. Today, the capabilities that consumed huge resources on older chips are a single-digit percent or less of the power or die area budget of a modern microprocessor. Comparisons between a variety of ISAs have demonstrated that architectural design decisions have a much larger impact on performance efficiency and power consumption than ISA does, at least above the micro controller level.

Will we still be using x86 chips 40 years from now? I have no idea. I doubt any of the Intel CPU designers that built the 8086 back in 1978 thought their core would go on to power most of the personal computing revolution of the 1980s and 1990s. But Intel's recent moves into fields like AI, machine learning, and cloud data centers are proof that the x86 family of CPUs isn't done evolving. No matter what happens in the future, 40 years of success are a tremendous legacy for one small chip — especially one which, as Stephen Morse says, "was intended to be short-lived and not have any successors."

Reported in www.extremetech.com on June 8, 2018.

Tidbits of probably useless information

Colossus, was a set of computers developed by British code-breakers in the years 1943–1945 to help in the decipher of the German Enigma machine. Regarded as the world's first programmable, electronic, digital computer, using over 2000 tubes.

During development of the Mark II computer in 1945, a relay inside the computer failed and researchers found a dead moth inside. This is the origin of the computer terms 'bug' and 'debugging'.

IBM took the lead in computer sales in 1956 from Remington-Rand by selling just 76 computers.

William (Bill) Powell Lear was an American inventor and businessman. He is best known as the inventor of the Learjet, car radio (Motorola) and 8-track stereo. He spent the last 10 years of his life failing to create a practical steam-powered car.

* * * * * SOFTWARE and HARDWARE * * * * *

Ask Leo !
By Leo Notenboom, https://askleo.com/
Technology With Confidence
Making Technology Work For Everyone

How Do I Create a Bootable USB Thumb Drive from an ISO?

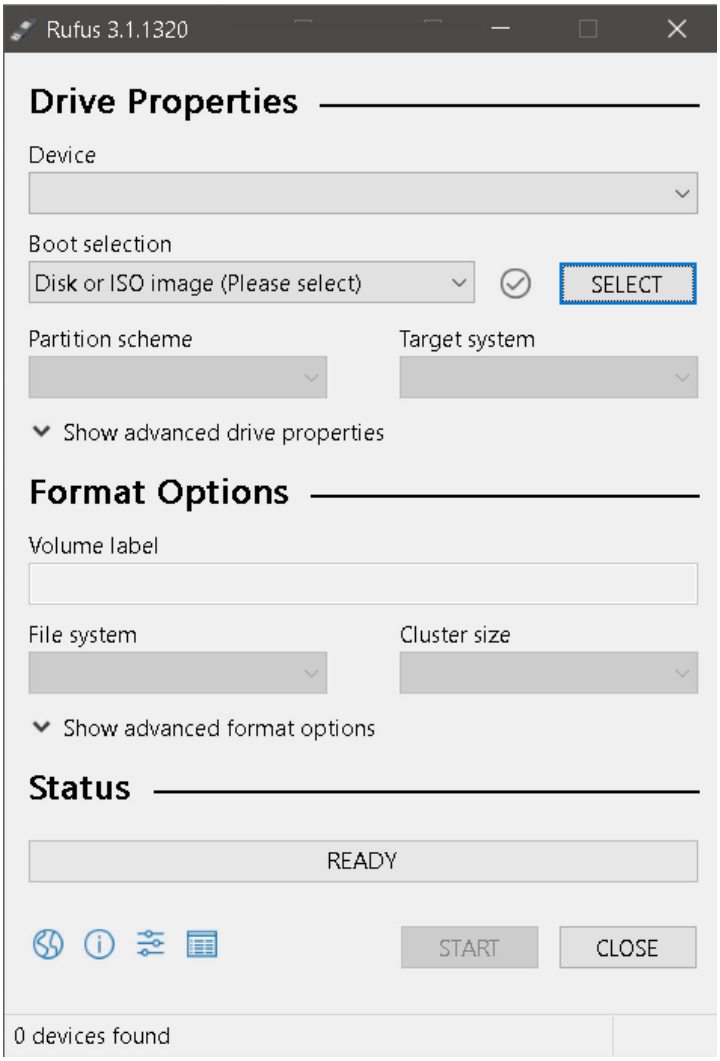
If you don't have a CD or DVD drive, you may be able to turn that ISO image into a bootable USB thumb drive.

ISO files are disk images often used to distribute software. In years past, we burned them to CDs. As the ISOs themselves became larger, we'd burn them to DVDs instead. In either case, we would then boot from the CD or DVD to run whatever the software provided. A good example might be operating system installation DVDs. More and more machines are coming without optical drives — that is, they don't have the ability to read a CD or DVD, much less boot from it. Fortunately, there are tools we can use to take an ISO that contains a bootable image and place it on a USB thumb drive from which you can boot.

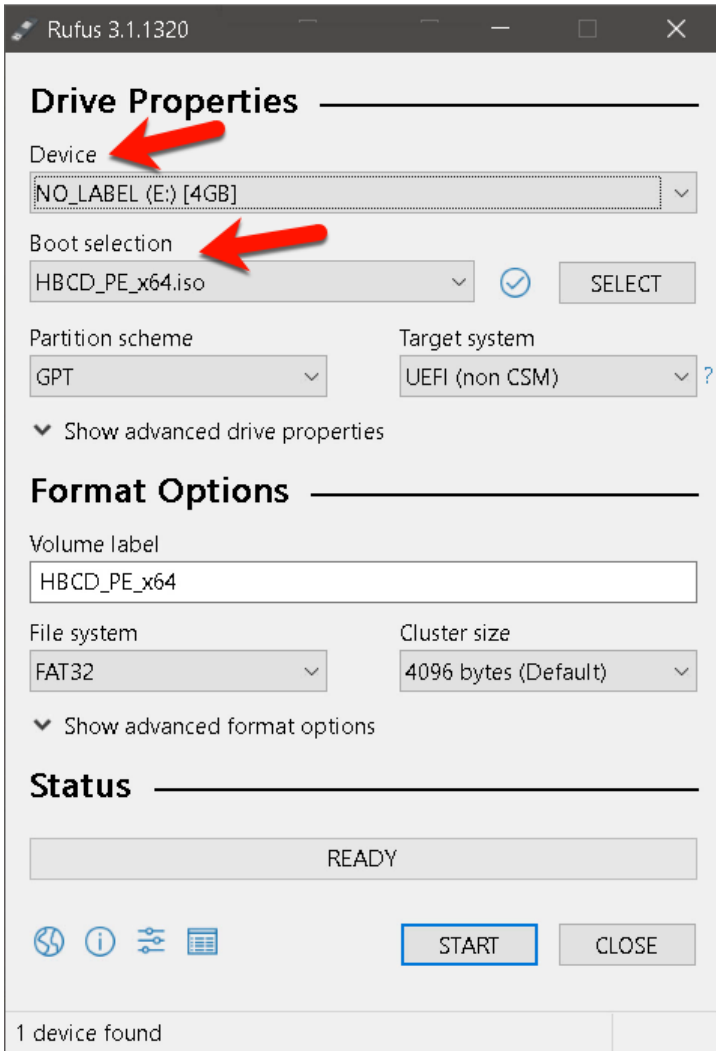
Rufus

There are actually several tools, but one I've run across that seems to do the job simply and well is called Rufus.

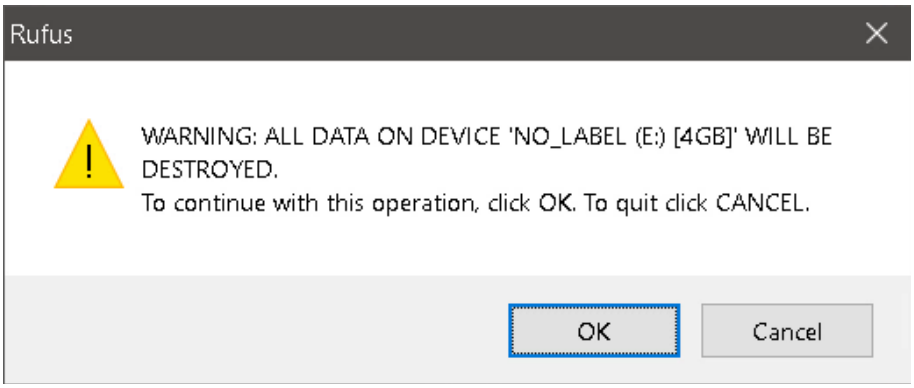
Download and run Rufus directly from the Rufus website.



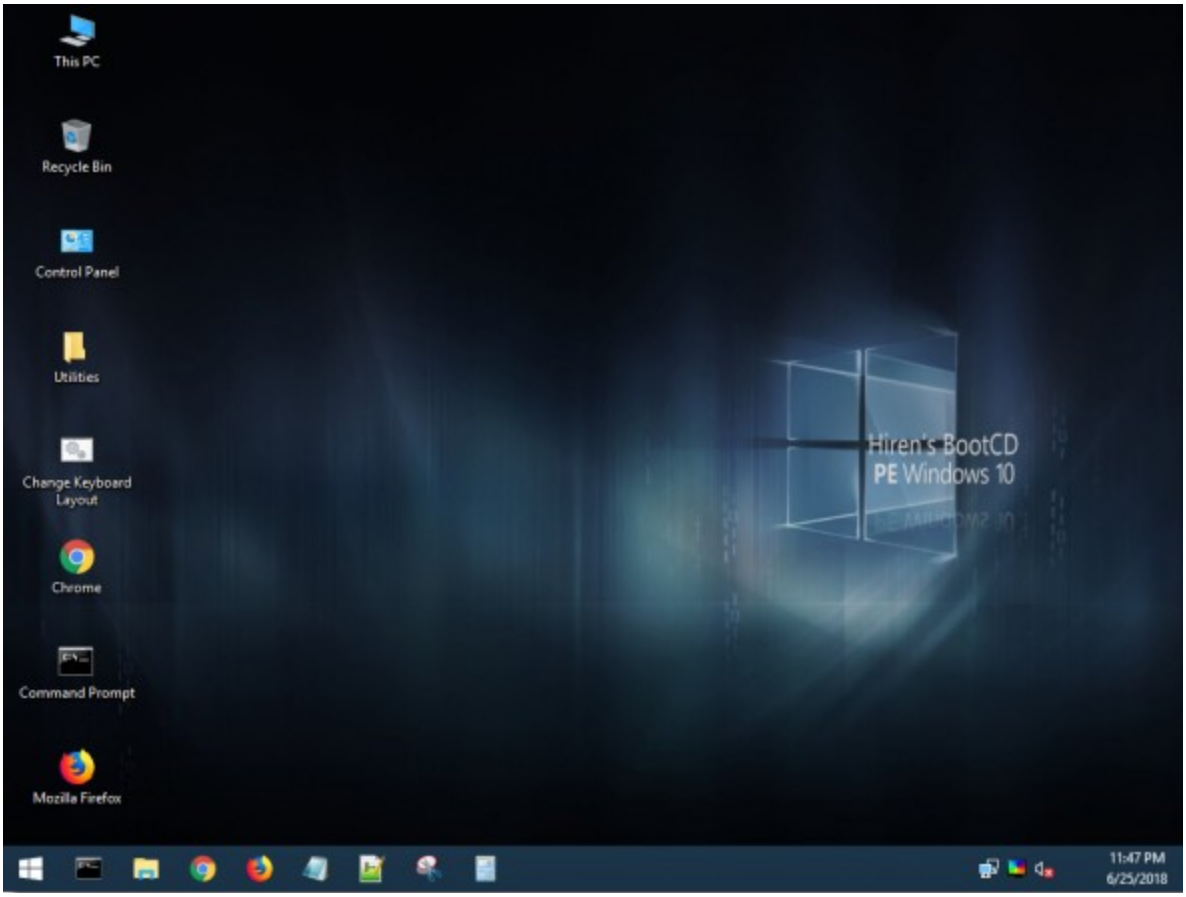
Under "Device", select the USB thumb drive you want used. If none appear, make sure you've inserted one and Windows recognizes its presence. Under "Boot selection", use the **Select** button to locate the .iso file you want to copy to this USB thumb drive. In the example below, I've inserted an unlabeled USB thumb drive that appears as "E:", and I've selected the file HBCD_PE_x64.iso (the most recent Hiren's Boot CD), that I'd downloaded previously.



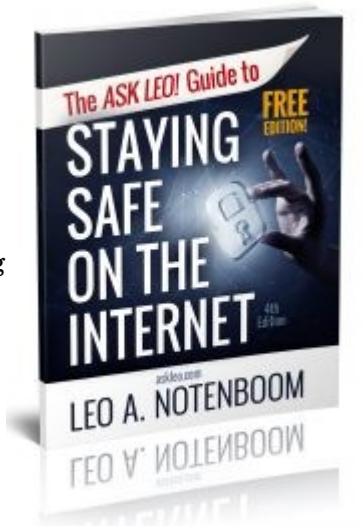
That's all I needed to do. Click **Start** to begin the process. You'll get a warning.



This operation erases everything that's currently on the USB flash drive and replaces it with the contents of the ISO. Make sure that's what you want to do and click **OK**. Exactly how long this takes will vary depending on the size of the ISO you're writing, the speed of your hard disk, the speed of your flash drive, and whether you're using a USB 2 or 3 interface. After all is said and done, you have a bootable USB flash drive.



* * * End of Article * * *



Internet Safety Is Possible! Subscribe to The Ask Leo! Newsletter and get a copy of *The Ask Leo! Guide to Staying Safe on the Internet – FREE Edition*. This ebook will help you identify the most important steps you can take to keep your computer, and yourself, safe as you navigate today's digital landscape.
Then each week in **The Ask Leo! Newsletter** you'll get even more tips, tricks, answers and ideas to help you use your technology more effectively and stay safe doing so.

Computer Recycling

23 Sep, 2018 Senator Robach – Ecopark,
10 Avion Drive – Rochester, 9:30 am - 12:30 pm.
Rain or shine… drive through and we'll unload your electronics!
Limit of two CRT (tube) monitors or televisions per vehicle.

Should you leave your computer on 24 HOURS A DAY?

By Joe Isaac
Central Kentucky Computer Society

NO! I shut my computer down every night. If I'm going to be gone several days I not only shut it down, I unplug the computer from the wall and unplug the phone line from the wall.

You are wearing your fan motor out and pulling dust thru your computer. Your hard drive may be running more. If you get a big surge of electricity that jumps your surge protector, it may save your computer by having it turned off.

Your surge protector is passive and works whether it is turned off or on. When it is off, the surge must jump the switch and the surge protector to get to your computer.

The only good thing about leaving your computer on is that you can get rid of the dust bunnies, the fan will pull them into your computer and your utility company will love you.

With the increased use of always on – DSL and Cable Internet and with the growing threat of hackers and worms, it makes even more sense to shut your computer down when not in use. **A computer not running and not connected cannot be hacked**.

OTHER GREAT REASONS TO CUT YOUR COMPUTER OFF AT NIGHT.

- It's not unusual to get low on system resources after you use Windows for a long stretch, especially if you open and close programs frequently. Adding a bunch of RAM doesn't help. System resources are stored in fixed memory blocks that reside in your System RAM.
- Programs store certain routines inside your system resources. Some programs don't reallocate or release the memory, so after a while your machine gets full. You must restart Windows to free up memory again.

That's why Windows feels more reliable if you start it up fresh every day.

From the March 2018 issue, CKCS newsletter, www.ckcs.org, newsletter@ckcs.org.

WaveLink Wireless Doorbell

By George Harding, Treasurer
Tucson Computer Society

I received this product for review. It has several parts: a plug-in unit that produces the bell sound, two buttons, a motion detector and a door open/close alert sensor.

This product is very easy to install and use. The plug-in unit simply plugs into a wall outlet and is ready to use. It has two buttons on its side, one for a selection of tones, the other for volume. The tone selection is extensive, consisting of 52 different tones and 4 volume levels.

The two buttons are simple affairs, with a quarter-sized button that lights up when you press it. Each button can be attached to a wall or a door frame with wood screws, anchors or with double-sided tape. Screws, anchors, and tape are supplied. The buttons are each powered by a small 12v alkaline battery.

The motion detector senses motion and triggers the doorbell. Thus, you get an advance warning of a visitor. It is powered by two AAA batteries. The unit attaches with a small plate that screws to a wall and has a movable ball attached, so that the detector can be pointed in any direction.

Lastly, the door alert sensor comes in two parts, a thin piece, about 3/4 inches wide and 3 inches long. The other piece is about twice as wide and is

powered by a AA battery. The narrow piece attaches to the door and the larger piece attaches to the frame. When the door opens, the bell rings, giving you an alert that the door has been opened. The two pieces are attached using screws, anchors or double-sided tape.

This kit, consisting of bell, buttons, sensor and alert unit, is easy to set up and install. I had some trouble figuring out how to pair the motion detector to the bell unit, but I was given access to a YouTube video explaining the procedure, which gave me what I needed.

WaveLink Wireless Doorbell by Fosmon, www.fosmon.com. Price varies by components in package, $15-$35.

From the March, 2018, www.aztcs.org/, actuary110@yahoo.com.

Dan's Desk

Computer Fundamentals #1

By Dan Douglas, President
Space Coast PCUG, FL

Starting with this March issue, I'm going to start a recurring "Computer Fundamentals" series of articles tied into sessions at the Saturday Learning Center meetings. I'll attempt in this series to explain fundamentals of computers, programming and usage that will hopefully deepen your understanding of how it all works and why things are the way they are.

Computing is all about taking some input, doing something with it and producing some output. How this evolved into today's pervasive technology is amazing.

Herman Hollerith was a US Census worker leading up to the 1880 census. At that time all census data was counted by hand and he recognized a need for a tabulating machine to reduce the time it took to summarize the information. The input was the census forms, a summary of the data is what needed to be done with the input data and the output was the census reports. He invented a tabulating machine that used punch cards that were like those already in use by automated loom machines. The company that he formed, the Tabulating Machine Company, became a great success until the 1910 census when a Census Bureau technician improved on the Hollerith design and removed the monopoly that had been in place. The Tabulating Machine Company later became a company you may have heard of: International Business Machines Corporation (IBM).

If we jump forward a hundred years, what do we have for 1980 state of the art computing? Computers that take up a large room with special power and cooling requirements. Large cables connecting the main processing unit to storage devices that were typically disc drives, tape drives, or some other medium. Input was in the form of punched cards (still!), data stored on storage media or operator terminal screens. Output took the form of storage media as in updated files or printed report output, or as a screen display of information. Computer programs were no longer coded on punched cards, but rather as files (think .exe files) that were executed by operator commands or by automation tools. Networking was done by dedicated circuits where security was important from point A to point B. There is a mainframe Operating System (OS) in control of the processing unit. This is the large company environment of 'mainframe' computers still in use throughout the world today.

What came after that was essentially the miniaturization of that mainframe environment into a desktop sized machine. We have a similar OS with either Windows or Mac that runs today's PCs. The PC uses a Central Processing Unit (CPU) typically made by either Intel or AMD that performs the instructions that programs (those .exe files) tell it to process. The input of today takes the form of icons that you click or touch on a display screen, or by automated tasks that run programs periodically. Storage is on your hard disc drive or USB memory stick or SD card. Output can be information displayed on your screen or a report that you print or files that you save on your hard drive.

Here are the core components that every 'computer' type of device have always had:

- a CPU or processing engine of some sort to interpret instructions and to do something - one or more input sources (a button to press, a screen to touch, a sensor, a file to read, etc.)

- one or more programs to take some information or data and do something with it
- one or more outputs (printer, files stored on some media, a screen display, etc.)

Next, we'll look at programming and how your OS controls everything.

From the March 2018 issue, The Space Coast PC Journal, www.scpcug.org, datadan@msn.com.

Kretchmar's Korner

The Facebook Dilemma

by David Kretchmar, Computer Hardware Technician
Sun City Summerlin Computer Club NV

Facebook can feel relatively innocent and passive. It's an application we use to get information, keep in touch with friends and family, and be entertained by posts from Facebook friends or our own news feed. It is easy to forget that Facebook is an advertising business, with interests and purposes of its own. Before recent revelations we might have forgotten that Facebook uses information it has collected from us for profit. Its power over our lives is largely hidden under a veneer of passivity and electronic voyeurism.

We have recently learned that Facebook was a major provider of "Fake news." This is especially concerning since well over half of Facebook users get much of their news from Facebook. We now know that Russia used Facebook in an attempt to influence the 2016 election.

Also, it has been revealed that Facebook shared a massive amount of user data with a political consulting company, Cambridge Analytica, and the information was used to fine tune the campaigns of politicians.

Whether you feel President Trump's victory was a good or bad thing, Facebook's role in the 2016 election should be a matter of concern. In a democracy, voters need accurate information to make a reasoned judgement. Forces outside of our country should not be able to unduly influence American voters.

Facebook has a deeply addictive impact on its users, one that we should be more aware of than we probably are. Facebook has already done a great deal to shape our minds, bodies and communities. Facebook's News Feed is meant to encourage users to stay online — past the point of fun or getting useful data. Some former Facebook employees have alleged that "the platform's features were consciously engineered to induce a dopamine hit to keep people hooked." Social scientists compare technologies such as Facebook to slot machines and other addictive habits in terms of their impact on our minds and bodies — as well as on our inability to just stay away.

It's easy to think of Facebook as a blank slate on which the thoughts, pictures and videos of our friends and family appear. But there is much more going on with Facebook as with many social networks. When it comes to getting information, the platform matters as much as the actual content.

Facebook profits more when we remain on its platform longer, watching ads and videos, playing games, liking posts, and messaging our friends. Facebook makes more money when we are addicted, even if studies show that inordinate amounts of time online are bad for our mental and physical health.

Cyberbullying and online peer pressure have deeply affected younger users on Facebook and other social media platforms. Electronic influenced depression and anxiety are affecting older social media users as well. We can barely imagine how that bad influence will grow and change as Facebook incorporates artificial intelligence and virtual reality.

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